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Hip Fracture Incidence among the Old and Very Old: A Population-Based Study of 745,435 Cases

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Abstract: Data were obtained from the Health Care Financing Administration and the Department of Veterans Affairs (formerly called Veterans Administration) on all hospital discharges among the elderly population from 1984 through 1987 and combined with census estimates to calculate incidence rates of hip fracture for the elderly population of the United States. Rates for White women were the highest, reaching 35.4 per 1,000 per year among 95 year-olds. Comparably, White men, Black women, and Black men experienced similar age-related increases in risk, although of less magnitude and relatively less rate of change, respectively. (*Am J Public Health* 1990; 80:871-873.)

Introduction

Hip fractures are an important cause of the morbidity and mortality experienced by the elderly population in the United States.¹ Despite this, there have been relatively few national population-based studies of the incidence of hip fracture in this country. Of those previous studies, most have produced unstable estimates of incidence rates for non-Whites (due to small sample sizes)^{2,3} or the oldest old (over 85 years of age).²⁻⁷ The present study uses newly available data from the Health Care Financing Administration (HCFA) and the Department of Veterans Affairs (VA) to provide detailed estimates of the incidence of hip fracture in the elderly by age, race, and sex.

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Methods

Data were obtained from HCFA on all 40 million short-stay hospital discharges for the calendar years 1984 through 1987 and 4 million discharges from VA hospitals. HCFA requires all institutional providers to submit a uniform billing form that contains the following data: age, race, sex, a maximum of five ICD9-CM diagnostic categories, date of admission and discharge, and a unique patient identifier. VA maintains a similar database, keyed by the same patient identifier.

Cases of hip fracture were identified by scanning the 44 million discharge records for a discharge diagnosis of fracture of the hip (ICD9-CM 820.0 through 820.9) in any of the five diagnostic fields. Patients were excluded if: 1) age at admission was less than 65 years; 2) the fracture could have been attributed to a neoplastic process; 3) the patient had been discharged previously for fracture of the hip in the four-year period; 4) the first discharge diagnosis was for late effects of fracture; or 5) the patient resided outside of Puerto Rico or the United States proper. The remaining cases were considered to be first fractures of the hip and thus comprised the numerator for the calculation of rates.

Denominator information was obtained from the Bureau of the Census for 1985. Incidence rates were calculated as the average annual age-, race-, and sex-specific number of cases divided by the population at risk. Rates were adjusted for one-year age groups using the direct method, with the entire United States population aged 65 years and older serving as the standard.⁸

Results

During the period of 1984 through 1987, 810,949 hospital discharges for fracture of the hip were recorded by HCFA and 11,435 were recorded by VA for persons over 65 years of age. Of these, 54,055 were second fractures or rehospitalizations for a previous hip fracture. An additional 19,899 cases were persons under the age of 65 from the HCFA database, and 4,504 cases were discharged for late effects or attributable to neoplastic processes. The final number of eligible incident cases of first hip fracture was 745,435. (Some cases were excluded for more than one reason.) Women accounted

for 580,129 of these fractures (79 percent) whereas men accounted for only 165,306 (21 percent) (Table 1). The great majority of the cases were among Whites (93 percent), while Blacks and those of other or unknown racial background each accounted for 3 percent.

The incidence of hip fracture among the elderly for this time period was 6.63 fractures per 1,000 per year. Adjusting incidence rates for age, White women experienced the highest incidence rates at 8.07 per 1,000, followed by White men at 4.28/1,000, Black women at 3.06/1,000, and Black men at 2.38/1,000. Examining incidence rates by one year age groups (Figure 1) shows that rates for White women increased exponentially from 1.63/1,000 in 65 year-olds, to 35.4/1,000 in women aged 95 years. A similar exponential pattern of increase was observed for White males, with rates increasing from 0.9/1,000 for 65-year-olds to 26.0/1,000 for 96-year-olds. The age-associated increase in incidence persisted in Blacks, but was less than exponential in women and nearly linear in men.

Discussion

The risk of fracture of the hip increased with age well into the tenth decade of life for women and men, and Blacks and Whites alike. Incidence rates for White women between the ages of 85 and 95 were especially high, with more than 3 percent of this population suffering a fracture of the hip. White men, Black women, and Black men also suffered from high rates of injury, with rates reaching nearly 3, 2, and 1 percent of the nonagenarians, respectively.

The rates for White men and women calculated in this study resemble those reported from the Scandinavian countries,⁹⁻¹¹ except that rates in the oldest women appear to be higher in Sweden.¹¹ Estimates from Rochester, Minnesota appear to underestimate rates for both men and women over

TABLE 1—Demographic Characteristics of Elderly Hip Fracture Patients Medicare and VA Population: 1984-87

	Sex		Total N (%)
	Women N (%)	Men N (%)	
All Races	580,129	165,306	745,435
Blacks	17,143	7,809	24,952
65-74	3,424 (20.0)*	2,697 (34.5)*	6,121 (24.5)†
75-84	6,819 (39.8)	3,063 (39.2)	9,882 (39.6)
85-94	5,966 (34.8)	1,820 (23.3)	7,786 (31.2)
95+	934 (5.4)	229 (2.9)	1,163 (4.7)
Whites	544,100	151,872	695,972
65-74	103,150 (19.0)	40,323 (26.6)	143,473 (20.6)
75-84	233,140 (42.8)	64,344 (42.4)	297,484 (42.7)
85-94	189,548 (34.8)	42,978 (28.3)	232,526 (33.4)
95+	18,262 (3.4)	4,227 (2.8)	22,489 (3.2)
Other	3,740	1,801	5,541
65-74	1,131 (30.2)	548 (30.4)	1,679 (30.3)
75-84	1,319 (35.3)	725 (40.3)	2,044 (36.9)
85-94	1,118 (29.9)	473 (26.3)	1,591 (28.7)
95+	172 (4.6)	55 (3.1)	227 (5.2)
Unknown	15,146	3,824	18,970
65-74	3,375 (22.3)	1,211 (31.7)	4,586 (24.2)
75-84	6,272 (41.4)	1,766 (46.2)	8,038 (42.4)
85-94	4,560 (30.1)	736 (19.3)	5,296 (27.9)
95+	939 (6.2)	111 (2.9)	1,050 (5.5)

*Percent of Race- and Sex-Specific Category.

†Percent of Race-Specific Category.

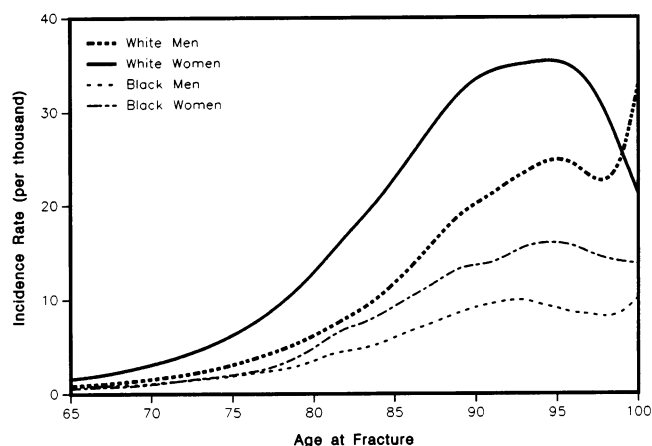


FIGURE 1—Annual Age-Specific Incidence of Hip Fracture among the Elderly: Population-based Rates by Race and Sex for 1984-87, United States
Lines represent a smoothed curve based on the calculated age-, race-, and sex-specific incidence rates.

SOURCES: Health Care Financing Administration, Department of Veterans Affairs, US Bureau of Census.

the age of 80 years,⁵⁻⁷ but this may be due to small sample sizes. It is noteworthy that our results substantiate prior national estimates using data from the National Hospital Discharge Survey for all race and age groups,^{2,4,12} despite the previously noted problems with similar data.¹³

There are several limitations in these data. The assumption that all fractures of the hip necessarily result in hospitalization is probably valid, because hip fractures are associated with a great deal of pain and incapacity; but persons who did not survive long enough to be hospitalized would be missed. A second assumption is that persons hospitalized in this age range are covered by the Medicare insurance program or cared for in VA hospitals. According to the Health Care Financing Administration,¹⁴ 97 percent of the United States population ages 65 and older is enrolled in the Medicare program. The number of cases treated in VA hospitals appears to account for the vast majority of the remaining 3 percent, suggesting these rates reflect true population rates.

These data may over-estimate the risk of an incident first fracture since data are only available for up to four years of follow-up. The rates presented herein may represent up to a 6 percent over-estimate of the risk of a first fracture. Likewise, the use of these data to estimate the prevalence of fracture would result in an underestimate for the same reason.

The apparent decline in fracture incidence after age 95 among white women is intriguing. Possibly, women who are at risk of fracture have been removed from the population through fracture-related mortality or competing causes. It is noteworthy that this decline persists when all fractures during the four years of follow-up are included in the numerator. Alternatively, this result may reflect some degree of non-sampling error inherent to the data. Only more detailed surveillance of an elderly population will provide the opportunity to ascertain the meaning of the decline.

ACKNOWLEDGMENTS

The data were presented at the Steenbock Symposium on Osteoporosis in Madison, WI, June 1989 and the 117th Annual Meeting of the American Public Health Association, in Chicago, Illinois, October 1989. This work was completed with the cooperation of the Health Care Financing Administration.

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Swaddling and Acute Respiratory Infections

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Abstract: In Turkey and China the ancient practice of swaddling is still commonly practiced. Both countries have extremely high rates of pneumonia, especially during the neonatal period. Preliminary evidence on the possibility that swaddling may interfere with normal respiratory function and thereby predispose to pneumonia was gathered in a teaching health center in Ankara. Babies who had been swaddled for at least three months were four times more likely to have developed pneumonia (confirmed radiologically) and upper respiratory infections than babies who were unswaddled. These preliminary findings were highly significant and are being followed up by further studies. (*Am J Public Health* 1990; 80:873-875.)

Introduction

The ancient practice of swaddling has almost disappeared in most countries of the world. A national sample survey in Turkey, however, showed that 93 percent of mothers swaddle their children.¹ In China also, most babies are tightly swaddled from birth through the first several months of life.² Since these two countries include over one-fifth of the children of the world, the number of swaddled babies is substantial.

In both countries pneumonia is the first cause of death among children, with particularly high incidence among neonates. In Turkey about 50,000 infant deaths occur annually due to pneumonia.³ In China over 300,000 child deaths per year are attributed to pneumonia with a child mortality rate twice as high as the second highest cause of death.⁴ Forty percent of these deaths are under one month of age.

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In trying to explain this extremely high incidence of pneumonia we focused on the possibility that swaddling might interfere with normal respiratory function and lung expansion. No studies have been published of possible relationships between swaddling and acute respiratory infections or pneumonia.

The common cultural practice is that immediately after birth babies are tightly bound in layers of cloth. Complete swaddling immobilizes the baby from the neck to the feet. The legs are pressed firmly together with the knees straight and the arms are bound to the sides or slightly to the front of the body. The layers of cloth are not only pulled tightly but they are also securely tied to minimize body movement. In partial swaddling cloth is wrapped around the legs and torso up to the armpits, but the arms are free. In both types of swaddling the child may also be covered with netting or a blanket to prevent exposure to flies, drafts or cold air. Babies are almost always laid on their backs and kept in a dark room to induce sleep.⁵ Swaddled babies seldom cry and respirations seem shallow to an observer, raising the question of whether full expansion of the lungs occurs. A variety of devices are used to dispose of excreta in Turkey but in the urban area where this study was done families use cloth diapers.

Methods

The records from Gulveren Health Center in a suburb of Ankara were examined to look for associations between swaddling and selected health problems. This teaching health center of Hacettepe Medical School has high standards of follow-up and care of all the children in the health center area. Records were available on 186 infants, of whom 94 had been unswaddled, 29 had been partially swaddled, and 63 had been completely swaddled. The rate of swaddling is lower than the national figure because this study included only those babies who were swaddled for at least three months.

All infants were examined and detailed histories were taken. The ages of the children at the time of this cross-sectional study ranged from three to 12 months, with a mean of 6.8 months. Sex ratios were similar in all groups as shown